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From inquiry amongst the Bedouins and European residents in Palestine it was ascertained that during the early summer the level of the sea falls at least 6 feet below the level at which it stood on the day the levelling was taken, which would make the depression 1298 feet, and we may conclude that the maximum depression at no time exceeds 1300 feet. Lieut. Symonds, R.E., in 1841, made the depression 1312·2 feet.

The soundings in the Dead Sea by Lieut. Vignes of the French Navy, gave a maximum depth of 1148 feet; making the depression of the bottom of the Dead Sea 2446 feet below the level of the Mediterranean.

The soundings in the Mediterranean midway between Malta and Candia by Captain Spratt, R.N., gave a depth of 13,020 feet, or a depression of the bottom five times greater than that of the bottom of the Dead Sea.

The levelling was executed by two independent observers, and from a comparison of the two sets of levelling it is certain that the levels have been obtained with absolute accuracy to within 3 or 4 inches.

The establishment of a chain of levels across the country with Bench-marks cut on so many points cannot but prove of the utmost importance for any future investigations or for any more extended surveys in Palestine, such as are contemplated by the Society which has been formed, since this survey was made, "for the accurate and systematic investigation of the archæology, the topography, the geology and physical geography, &c., of the Holy Land for Biblical illustration."

For the survey of Jerusalem itself it was of the utmost importance, as it enabled us to connect all the levels in and about the city with the level of the Mediterranean, and to harmonise, so to speak, all the levels which have been taken.

XV.—*Journal of an Expedition from the Government Camp, Camden Harbour, to the Southward of the Glenelg River in North-Western Australia.* By R. J. SHOLL, Esq.*

[Communicated by the Colonial Office.]

Monday, April 10th, 1865.—Immediately after leaving the camp we ascended a hill to the south-east, very stony and rocky, yet, as usual, clothed with grass; and for about an hour we

* See Mr. Martin's Journal of Explorations in the same region, 'Journal Royal Geographical Society,' vol. xxxv. p. 237. No map embodying the recent surveys of the district has yet been received by the Society, but the map in Grey and Lushington's 'Journals of Two Expeditions of Discovery in North-Western Australia' may be consulted with reference to the present memoir.—[Ed.]

travelled over country of a similar description, yet with hills gradually decreasing in height. The country was lightly timbered with eucalyptus, cork, and cotton trees, all of small diameter. The hills we passed over might, I conceive, be made passable for carts with very little labour. Everywhere we passed through grass, the country presenting the appearance of a wheat-field, the grass being generally above the horses' bellies, and occasionally even above the heads of the riders. From the summit of the highest hill we had a splendid view of Camden Harbour, with its islands and headlands to our right and rear, with Mount King in the distance to our right and front. The baobab described by Dr. Martin is situated in flat country; and, indeed, after leaving the hills in rear of our camp, we travelled over tolerably level country, occasionally undulating with ironstone gravel, having the appearance of being waterwashed in heavy floods. The ground was in places very soft, and must be boggy during the winter season. I do not consider that we have had a winter, or rather rainy season, this year. About a mile on our course from the marked baobab we passed over several gullies, with quartz scattered among the gravel. After leaving this country we ascended some tolerably elevated ground, from which we saw Mount Lookover, Port George IV., and Augustus Water, in our rear; and Mount King to the south-west. Mount Lyell lay to the south-east of us, and was plainly seen. Passing over the level country we saw several kangaroos. The land was still lightly timbered with eucalyptus, what is here named the cork-tree, cotton-tree, box-tree, and, where the ground was particularly soft, cabbage-palms.

Shortly before our midday halt we commenced crossing the Hampton Downs, which, at this particular spot, was not so well grassed as the country we had previously passed over, but it gradually improved. We encamped at noon, amidst abundance of feed, on the bank of a stream which I thought to be a branch or tributary of the Gairdner River. We had previously passed over a larger stream, with somewhat boggy approaches, and having on its banks, where we crossed, a small thicket of palms, an eucalyptus, with large broad leaves, and other shrubs and trees more vividly green and throwing more shade than is generally found in Western Australia. These streams evidently took their rise in the McDonald range, and ultimately joined the Gairdner. They were shallow, but during the rainy season these, as well as many dry stream-beds which we crossed, must contain a large body of water. The stream upon which we camped was running to the southward. We bivouacked under what is here called the currant-tree, about 9 or 10 feet high, greyish striated bark, with twisted branches. The leaf is bright-green, smooth on the upper surface,

5 inches long, and 1 to $1\frac{1}{2}$ inch broad. The fruit has a pleasant acid taste—black when ripe. It is of the size of a very small currant, and, like most Australian fruits, has more stone than flesh. It grows in small bunches, the fruit being in different stages of maturity, green, red, and black. The stone or seed is of a flat, oval shape. The branches appear to be adapted for boat-knees, being light and tough. Close by there was another tree, altogether unlike what I have seen elsewhere. It was a tall, rough-barked young tree. The branches do not spread, but take an upward direction, and the leaves spring from the smaller branches in fours. They were pointed, about $2\frac{1}{2}$ inches long and $\frac{3}{4}$ inch broad in their widest part, or the centre; they are of a light-green colour. The tree was about 10 inches diameter at the butt, or thickest part. There was also near us the everlasting eucalyptus, with its smooth white stem and branches. The grass at this place was principally kangaroo-grass. More birds were seen on our way than we have met with at the camp. They were principally pigeons, of a brown colour, but not bronze-winged.

Started at 3 o'clock, by which time the sun was less powerful. Our party now consisted of eight, with four packhorses, and we made a track, going in single file, which will last for some time. We steered an east course through Hampton Downs—a well-watered country: creeks, running in the direction of the Gairdner, being crossed every half or three-quarters of an hour. The land was undulating, composed of ironstone, sand, and clay alternately, and occasionally—especially near some of the creeks—of alluvial soil. Whatever the soil might be, there was no lack of grass. In crossing some of the streams, the ground was soft—almost boggy, and at the chosen fording-place of a branch of the Gairdner Mr. McRae's horse was so far bogged as to oblige him to dismount. To the southward of us there was a prominent hill, which the settlers have named Mount Batten, and near it was the elevated termination of a piece of high table-land, looking, until we came closer to it, like a detached hill. They are conspicuous landmarks. We halted for the night on the left bank of the Gairdner, a small stream at this season, with boggy approaches where we crossed it. The banks were fringed with palms. Our halting-place was about 10 miles distant from the camp. During the day I saw more grass than I have seen in any part of Western Australia; most of it kangaroo-grass, and some a reedlike grass, of a coarse nature. Some of the grasses, especially those on swampy land, were sedgy. The day was tolerably cool throughout.

April 11th.—Started at 20 minutes to 6, and steerèd an easterly course for about an hour, and then E. by S. until 9 o'clock, when we again resumed our easterly route to obtain a pass through the hills. All the country passed over was well grassed, and the

soil not so stony as that travelled over yesterday. On the banks and in the immediate neighbourhood of the streams there was rich alluvial soil. About an hour after leaving our halting-place crossed a stream larger than that near which we camped last night. We went over some very soft, boggy ground, and had to pick our way carefully; but these places could be seen and, to a great extent, avoided. Not so with the "dry bogs," as they are termed. The ground is apparently firm—clay, with ironstone gravel—but is completely undermined. The horses plunged continually up to their knees, and no amount of care or circumspection could prevent this. The "dry bogs" were in patches over some four or five miles of country in our course. We skirted Mount Lyell, a two-peaked hill; the distance between either peak being about 1 mile. Halted on the banks of a stream at 10 o'clock, Mount Lyell bearing S.S.E., and distant about 2 miles. We passed through a perfect thicket of reed-grass, growing high above our heads; but generally the pasture consisted of kangaroo-grass, very thick and very high. The horses, when camped in the high grass, generally wandered to feed off less luxuriant growth. Before this country becomes available to its full extent for stock, the long grass will have to be burnt or cut down; it will never be eaten down. It may be trampled down, and allow room for the young grass to spring; but in its present state the feed has no attraction—for horse-stock, at all events. The whole of the land was lightly timbered with broad-leaved gum-trees, cotton, cork, and box trees, all of slight girth. At 9 o'clock we rode up a hill to look at the country. Mount Lyell was to the south of east, and not far off. We had a good view all round, embracing the valleys of the Glenelg and Prince Regent rivers. Our course was through Mr. McRae's run and the Hampton Downs, the greater portion of which are included in this run. The Hampton Downs are all they have been described—well watered and good feed. The stream upon which we were encamped was running through the Glenelg. Mr. Cowle stated our position to be lat. $15^{\circ} 57'$, long. $124^{\circ} 59'$. Left this place at 3 P.M., and passed through a splendidly-grassed country. The land improved very much, there being less stone and more alluvial. As we neared the Glenelg the trees increased in girth, but they were still scattered. There was no undergrowth of scrub, nothing but grass. We had some difficulty in crossing the numerous watercourses, some of them being very boggy. If we could have seen our way the impediment would not have been heeded, but the thick and high sward of grass concealed everything. We camped for the night on a stream a few miles from the Glenelg, upon a plain of ironstone gravel and quartz, but with the usual abundance of feed. We estimate the distance travelled to be 15 miles. Both peaks of

Mount Lyell were bare, the reddish-brown rock alone being visible. Grass appeared on the slopes, and at the base some light timber. During the day we saw some native plum-trees; the fruit exactly resembles a small plum, larger than a sloe. I was told that the fruit was intensely bitter. I could only secure one plum, and, content with the account given by others, did not taste it.

April 12th.—Had a sleepless night, the mosquitoes being on the *qui vive* until daylight. We proceeded towards the Glenelg, steering about due south, as indeed we had done from our halting-place at noon yesterday. Crossed several streams flowing towards the Glenelg, which were more difficult to pass than those farther north, the grass being higher and thicker, and the stream-beds more soft. Mr. McKrae, however, was a first-rate pioneer, and, after some trouble, we arrived on the banks of the Glenelg, at a spot where it was divided into two branches; both united lower down, leaving a small island between the two. This we followed for a about half a mile, when we came to some rapids; and at this spot the stream we struck was united to the main branch. The united streams were about 60 yards wide; but in the rainy season the river must be of considerable size, as there was abundant evidence of the flow of a large body of water. The soil on the bank is alluvial, in the bed of the river sandy and rocky. We crossed at the rapids without wetting our feet—the water was not, in fact, above the horses' knees—and then proceeded south for about half a mile, where I determined to form my permanent dépôt on the banks of a stream running into the Glenelg, with abundance of feed, plenty of firewood, sufficient shade, and, in fact, all that we require for the purpose. Our small tent was placed facing the south—our destined course—where at the distance of about a mile rise the Wheatley Hills. We arrived at this spot at 10 A.M. The country is generally gravelly, with occasional outcroppings of rock, and here and there patches of alluvial soil. There was no difference either in the character or quantity of the grass, while the trees and shrubs were of the same description as those we had passed before, except that at the Glenelg we again met with the baobab, though not of so large a size as those near our camp. On the banks of the river were paper-bark trees, lofty but of no great girth, the thickest not being more than 10 or 12 inches diameter. The foliage was similar in shape to that of the eucalypti, and possessed the same aromatic flavour. There were also some trees of moderate height, more umbrageous than the generality of Australian trees. They had a rough blackish bark, the leaves were dark and large, the trees bore a fruit not in shape unlike a large white-heart strawberry, of a yellow-white colour. The settlers called it the mulberry-tree, and say the fruit when ripe is not unpleasant. What I tasted were acrid. Between

our depôt-camp and the Glenelg we started a kangaroo, and on the banks of the river saw a flock of black cockatoos, apparently similar to those farther south. At our own depôt the hawks, which swarm to such an extent at Government Camp, began to collect. There were a few sand-flies and mosquitoes, but not swarming, as they did at our bivouac the night before. Cool day.

April 13th.—At a little before 7 A.M. Mr. Cowle and myself, accompanied by Messrs. McRae, Hindhaugh, Hick, and the native Billy, started on our first exploratory trip in the Ranges. We followed up the gully on which we were encamped for about an hour and a half, our course being easterly, with a little southing. The country was generally rough and occasionally boggy. Crossed the stream-bed more than once, the fords being boulders of slippery rock, over which the waters dashed. At its source we finally left the stream and vainly attempted to make south, but the hills, for the most part precipitous sandstone elevations, barred our progress. We dismounted and walked up one of the hills, leaving Billy in charge of the horses. The hill was of sandstone, with trap or basalt at the base. From the summit the country looked very rugged, especially in our course—south—the hills being tumbled together without any regard to arrangement, while the valleys were as rock-strewn as the hills. On this hill was a solitary pine—we had previously seen a few. It was not large, being from 12 to 15 inches diameter, and of moderate height. Descending, we tried our best to round the hills, but were baffled by the fearful country. Following on every occasion every valley which trended anywhere near our course, we were continually driven back by insurmountable barriers of rock. The valleys, in fact, were for the most part ravines, or ended in ravines; the hills coming down on either side, and allowing but a few feet of level country, if it can be called level where masses of rock of every conceivable size, shape, and angle, are strewn over the narrow path. The poor horses were tumbling, jumping, and sliding every minute, their legs and feet bleeding from the sharp rocks. After all this labour, towards midday we found ourselves not more than 5 miles from depôt, with no prospect of getting farther south in this direction. Before our noon-halt we tried to make the Glenelg by starting north and east, but failing, bivouacked in a small grass-flat surrounded by rocks, with a streamlet flowing through the centre. We passed along several of these flats during our morning journey. They were generally well grassed, and the soil was red loam, but they were all of very limited extent. Grass as usual was abundant in the most stony portions, and I only saw spinifex among the crevices of the otherwise bare blocks of sandstone. Starting at a quarter to 2 P.M. we pursued a generally north route, sometimes a little to the east or west, according to the course of

the ravines. We were now gradually descending, having during the former part of the day been going up-hill—sometimes imperceptibly, at others 30 and 40 feet in the course of a hundred yards. We passed through masses of sandstone, assuming fantastic shapes and forms, requiring but little effort of the imagination to give them “a local habitation and a name.” One plot of rock-scattered ground bore a marked resemblance to a ruined churchyard. The broken headstone, the dilapidated monument, the shivered pillar and fragments of sepulchral architecture—all were there, while some of the blocks were sharp in outline, and perfect as if they had just left the stone-cutter’s yard. At half-past 2, although we had since our noontide halt been travelling downwards, we were still on very high ground, with the River Glenelg some hundred feet below us, the descent being a perpendicular wall of rock; on the opposite side were hills of equal height and of equal steepness. Here there were rapids. The course of the river was north and south, taking, shortly from the spot where we were stationed, a turn to the eastward, and afterwards a south-east direction. As there was no chance of descending to the river at this spot, we followed a course a little to the eastward of north, and travelling down a ravine, the most steep, the most rugged, and the most lengthy of any we had hitherto travelled, and which punished the horses very severely, we emerged upon the level country south of the Glenelg, and struck that river about a quarter of a mile above the rapids which we crossed yesterday, and about two miles below the spot where its course was from south to north. At these rapids its direction was westerly. From the rapids we proceeded to the dépôt-camp, which we reached at 5 o’clock. My companions stated that the country was more rugged than any they had previously passed over, and they had all more or less had some experience of rough land; one of them, indeed, had travelled through the elevated Gipp’s Land territory. If our journey was fatiguing it was not otherwise unpleasant. The day was fine and cool; we had abundance of water; the scenery was not only novel, but extremely picturesque and often magnificent. A good bathe in the dépôt creek soon restored energy and strength, and without being damped by our non-success, we discussed the probable proceedings of the morrow. Seeing the impossibility of penetrating the ranges in the direction we had pursued, we resolved to take a south-westerly course as far as practicable.

April 14th.—A fine morning, but the flies, as usual, very troublesome. We went round the west end of Wheatly Range, travelling through more rugged country than even yesterday, but there was not so much of it. We wandered about for some little time, striving to penetrate through the hills, and struck the river, pursuing a course a little to the northward of east. The Glenelg

was here running south. The cliffs came down to the water's edge on either side, and we had not gone far along the bank before our way was stopped. We therefore pushed up the range, following the ravines and valleys, and steering south wherever we had a chance. The country was in every respect similar to that which we traversed yesterday, except that the valleys were not so well grassed, and there was more spinifex. After clearing the hills we passed over some tolerably level table-land, sandy, and thinly grassed, and at half-past 11 struck a large stream, which we took at first for the Glenelg, but, as it was flowing north, it was evidently a tributary. This stream I named, subject to the Governor's approval, the McRae, after one of my companions, a gentleman who had been of signal service to us throughout the expedition. The river, where we struck it, was $82\frac{1}{2}$ yards wide from bank to bank, but the actual stream of water did not exceed 20 yards, or, at the furthest, 25 yards. On a ledge of rock overhanging the river, we bivouacked; the horses looking at, but not touching, the spinifex. A spring of water burst from the rock, and formed a small stream, from whence we got a supply for ourselves and horses. On either side the rocks lined the river, but the hills were of no very great height. Among the plants in the neighbourhood I noticed the hollyhock—very similar to our own in leaf and flower; and the honeysuckle, red and white flowers, but scentless. The trees here, and in fact throughout the ranges where we have been, are eucalypti, casuarina, acacia, cotton, cork, box, and palms. Also some trees bearing a fruit resembling in appearance, when ripe, a russet apple, and, when unripe, a smooth green apple. It was intensely bitter, and contained a large stone—in fact, it was nearly all stone. There were some splendid lilies in the river, which emitted a perfume like the violet. They were of different colours—white, pink, and blue—the two latter light tints, as if the original white had been stained with colour. The river must rise in the ranges which we see to the southward, and will most probably furnish a pass through them. We could not, however, proceed in that direction to-day, in consequence of Mr. Cowle's horse having cut his leg too severely to travel. In fact, all our horses were more or less maimed. We started a kangaroo, but with so large a party it is next to impossible to get near enough to have a shot. On our return route we took a north-easterly course, following down a brook which we crossed on our outward trip, and which was descended by our horses with very great difficulty, owing to the steepness and rocky nature of its bed. Before arriving at this brook we crossed the sandy table-land of our outward track, above a mile to the southward and eastward, and found it thinly clothed with grass. We passed the Wheatly Range (by following the

before-named brook) to the westward of a detached hill on the eastern point of the mountains. We left the McRae at 2 o'clock, and arrived at *dépôt* camp at half-past 3. All the flat lands over which we have passed—and they are not many, and limited in extent—possess a soil of either sand or ironstone gravel, sometimes of both. The great peculiarity here, as well as in the land to the north of the Glenelg, is the total absence of undergrowth bushes; between the widely separated thin and short trees there is nothing but grass and creepers. Let it be thin or thick, good or bad, tall or short, still it is grass. The trees were generally of small girth; the largest we have yet seen did not exceed 15 inches diameter, and trees of this size were very rare. The baobab-trees of course are exceptions, for they, on the other hand, are of enormous circumference; but after leaving the tree named in my first day's journal, we did not see another until we came to the Glenelg, and then we met with a few. There is one or two near our *dépôt* camp. They are an unfailing sign of water—not necessarily surface water, but of water at a short distance from the surface. They are more plentiful near the government camp than I have seen elsewhere. Looking through the opening at the back of my tent, I see two as I am now writing, of noble girth, but not so large as others. Between the camp and the well, and along the now dry bed of the watercourse which supplied us when we first landed, and until lately, there were several, and this makes me the more confident that there will be no great difficulty in obtaining water at the driest season. The palms are generally indicative of surface water, and grow in soft swampy land, and upon the margins of rivers and streams. In travelling along, whenever we saw palms in our course, we prepared to flounder through soft or boggy ground, and in nine cases out of ten the ground was either the one or the other. The sandstones in the ranges have every variety of size, form, and colour. From blocks weighing hundreds of tons to pieces weighing a few grains; in shape, columnar, tabular, pyramidal, in pavement blocks, like gigantic walls, with every line separating each block, as level and as closely cut as if placed there by human agency, like ruined castles, with towers and battlements—half defined and half defaced, massive boulders, and pebbles of the size of marbles; lying in every attitude, presenting angles in every possible position, they seemed like the remains of cities, built by giants, and scattered abroad in some great convulsion of nature. The hues of the rock are varied to a degree—dark brown, light brown, yellowish brown, yellow, white, red of different shades; sometimes several colours in the same rock. Again, while many rocks are clothed with grass, others are quite bare. We have thus anything but monotony among the ranges. Owing to the cause before stated, we could

not make a good day's work, and our extreme distance south was not more than three miles, but the horses were nevertheless much bruised, and cut about the legs, and seemed to have had enough of it; so I determined to halt to-morrow (Saturday), and, as a matter of course, on the succeeding day, and then make a three days' trip, as there appears at last to be a chance of making some southing. We had a tolerably cool day, and in fact when we got among the hills the change of temperature for the better was invariably marked. Upon examining the map, it would appear either that we are not on the rapids named by Grey (at the spot where the river bends to the southward), or that the Wheatly Range, or the river itself, is incorrectly laid down. Our dépôt camp is about three-quarters of a mile south-west of the rapids, and the range faces us about half a mile, or from that to a mile distant, its position being east and west. To the eastward, half a mile's travelling brings us to the eastern end of the small detached hill round which we passed on our return trip this morning, and by going a mile to the westward, we came round the western point of the range. From a mile and three-quarters to two miles is the extent of the range facing us to the south, neither end of which, east or west, is distant more than a mile from the River Glenelg. According to the map, our present position is two miles to the eastward of the range, or in fact on the opposite bank of the Glenelg. We are on a peninsula, hemmed in by the river on every side, except south, with a point or two east or west of south; and such a peninsula! except the flat upon which we are encamped, which extends back to the rapids, and up and down the river for a limited extent, the country is one mass of sandstones, of more or less elevation. Mr. Cowle informed me that he was not yet perfectly satisfied of our exact position, but he was inclined to believe that we were not on the rapids described by Grey. We saw no marked trees, nor any other sign of Grey's party.

April 15th.—To-day was the hottest we have experienced since leaving Camden Harbour, the weather having been generally cool—much cooler than I have experienced it at Government Camp. We have also had some heavy dews at night—a very rare occurrence at camp. The festering sores which afflicted so many in camp are also fast disappearing. Saw to-day a beautiful water-lily growing in a different part of the creek upon which we are encamped. It was sweet scented; the flower was large, white-edged, with a fringe of light blue; and under the surface was blue, of a darker tint.

April 16th.—Remained in dépôt all day. Hawks swarming about the place in hundreds. Not a thing could be left for an instant but it was pounced upon, and, if at all eatable, carried away. Wherever we go, one or two accompany us; and no

sooner are fires lit, and preparations made for meals, than they come from all quarters. They are brown birds, about the size of a small fowl. They are fearless, and stand to be shot at, not moving, though the revolver-bullets strike the branch upon which they are perched within an inch of their bodies. Bathed in a pool of water a few hundred yards down our creek—a pleasant place, surrounded by palms, the only approach to tropical vegetation which I have seen.

April 17th.—We all had a tolerable night's rest, and started at 20 minutes to 7 A.M. on our journey. The party consisted, besides myself, of Mr. Cowle, who is somewhat better this morning, Mr. McRae, Mr. Hick, and Billy. We took three days' provisions. The day was fine, but calm. Found a much better pass to the eastward of the Wheatly Range than the one we travelled on Friday, on our return route, by following up a creek. At half-past 8 arrived at a spot a quarter of a mile north of our bivouac on Friday, travelling over comparatively easy country, tolerably well grassed. From this place we attempted to get south by following creeks, but did not make more than half a mile in a direct line by 10 o'clock, when we were brought up by a creek, with rocks to the water's edge on either side, and a barrier of rocks in the centre, over and among which the water tumbled very prettily. A fringe of palms skirting the stream added to its picturesque appearance. Mr. Hick shot two white cockatoos, somewhat different from those I had seen at Camden Harbour. The topknot was white, and the feathers under the wings light yellow. At Camden Harbour the topknot is sulphur-coloured. Got, near our halting-place, some berries, not unlike, in appearance, black currants. They grew on a tree, not dissimilar in height and appearance to the one described as being at our noontide halting-place on the 10th instant. The fruit, however, was different, larger, and growing on stalks—not in bunches; the leaves were light-green, smooth, 4 inches long, and $1\frac{1}{2}$ inch broad. They call it the elder-tree, but there is not much similitude. Around the camp I marked some smooth-barked white gum-trees, larger than any we have before seen—about 18 inches in diameter. Walked out with Messrs. Cowle and McRae to have a look at the country to the southward and westward. We went about a mile, and found, with the exception of some rocks near the camp, that the course, for this country, was fair travelling. Mr. McRae and myself climbed up two hills, Mr. Cowle being too unwell to make the attempt. We found the appearance of the country to the southward promising, but due south the ranges seemed to bar our progress. The Wheatly Range was beneath us to the north, and we could see over it the hills on the other side of the Glenelg. On one of the hills which we ascended there was a cave, in which

were the remains of a native fire—apparently one native. It was recent—that is to say, about ten days or a fortnight old—the ashes not having been either much disturbed by the wind or intermixed with dust and droppings from the roof the cave. We saw the McDonald ranges in the distance, and also Mount Lyell, far away from and beneath us. We estimated our height above the sea-level at 1800 feet. On our return picked up a piece of stone which the natives had been sharpening for their spears and knives, &c. It is something like obsidian, but not so highly glazed. The hills which we climbed were sandstone, with trap or basalt at the bases and in the valleys. The trap-rock was intersected by veins of quartz, and there was a peculiar outcropping of that stone in small spiculæ and large crystals. The ground at the base of the hills was strewn with the débris of quartz, some of it as fine as sand.

April 18th.—Left camp at half-past 7. Crossed numerous creeks and streams; this country is beautifully watered, and, steering s.w., at half-past 8 struck the McRae. At this spot it consisted of large reaches, bordered by palms and lofty paper-bark trees. The reaches were connected by narrow channels formed by the hills descending on either side. These channels were rock-strewn, and the water passed over between the rocks, either in the form of cascades or rapids, according to the height. We crossed the McRae at one of the rapids, and followed it up, the stream running about N.N.E., we of course steering in an opposite direction. The travelling became very difficult; the hills were often perpendicular, like walls of masonry, for in many places even the joints are distinctly marked, always precipitous. Our course was at the base; and when the ledge of rocks over which we travelled sloped off to the water's edge, we had to cross the stream the best way we could, and make our way along the opposite side until similar impediments compelled us again to ford the river, which we crossed and recrossed five times. Some of these fords were difficult, owing to the masses of rock of all shapes, over whose slippery points and surfaces the horses stumbled, and sometimes fell, but happily no accident happened to horse or rider. At one place we were blocked in on both sides, and had nothing for it but ascending the bank. We were at the time on the right side of the McRae, and luckily the hill was not so steep as its neighbours. It was, however, quite steep enough—something like Mount Eliza, at the back of my former residence, but not so high. We dismounted and led our horses, not going straight up the ascent, but twisting and turning among the large stones, and thus saving the animals an additional pull. Halting on the summit of the hill to breathe ourselves and horses for 10 minutes or so, we pursued our journey. By the river's side I noticed a peculiar-looking tree, the only one

of the sort that I observed during our journey. It was larger than its companions, and looked more like an English forest-tree than any I have seen in Australia. It was richly clothed with dark foliage, threw out long and spreading branches, and was a complete shade-giver. The leaves somewhat resemble the myrtle. The soil of the country over which we passed was sandy near the river, in patches between the rocks, and reddish brown upon the hills; but rocks and stones were everywhere, and grass of course. We have never been without grass—much of it coarse and rank, but most of it sweet and good. Saw some yellow-crested cockatoos near the hill which we had just climbed. The descent on the other side was not so abrupt, and we had no occasion to dismount. Passing over some level bare rocks, with here and there ledges from half a foot to a foot high, we were again brought to a halt at some rapids, which appeared difficult to cross, while our progress was barred by a wall of rocks, with no convenient shelf wide enough for our horses. In some still water a short distance from the rapids there were beautiful water-lilies—white, with edges fringed with filaments like feathers or down. The flower was five-petaled, small, and inodorous. With some splashing and slipping, we crossed the rapids, and, ascending a stony hill of moderate height, came along some tolerably level country for about a quarter of a mile. Here I observed for the first time, though it afterwards appeared that it was—if not plentiful—pretty generally dispersed, a fruit-bearing plant, about $2\frac{1}{2}$ feet high. There are two stems springing distinct from each other, the shorter one about one foot long, bearing a leaf which resembles somewhat the potato-plant; the longer one, 2 feet, bears the fruit in three pendulous seed-vessels, in shape like the English gooseberry, and enclosing a large number of striated seeds, enclosed in a sweetish pulp, the flavour being more grateful than most of the so-termed edible fruits of the country. The colour of the ripe seed-vessel is a rich sugar-brown. It exudes saccharine matter, and is sticky and clammy. I picked a specimen, root, stalks, leaves, and fruit; and also collected some fruit, which became crushed, and afterwards fermented in my haversack, but I managed to save the seed. When I arrived home, my son produced some specimens he had collected in the immediate neighbourhood of the camp; so it was no novelty, after all. Almost immediately after passing these plants, we came to a patch of baobab-trees, the first I had seen since leaving the Glenelg. Still following the course of the Glenelg—we were now on the left bank—we crossed again at some rapids, and, ascending a bank of moderate elevation and steepness, proceeded along some richly-grassed table-land—clayey soil, with stones intermixed—until gradually nearing the water's edge, the accustomed rocky bar compelled us once more to cross the river.

Travelled over some bare rocky ground, full of ledges and fissures, and, coming to a grassy flat, we camped at noon in its midst, among a clump of short trees, sufficiently close together to throw a grateful shade. Our halting-ground was about 80 yards from the McRae, distant from our sleeping-camp 7 miles, and from the dépôt (due south) 9 miles. Our course has been rather to the westward of south. While at dinner a hawk, more bold than his companions—and none of them are too modest—pounced down among the trees, and was easily caught by one of the party, and, after due examination, let go. Messrs. McRae and Hicks ascended a hill to the westward of our camp, and reported that the country looked clear in the direction of our course, but said there was a range running north and south to the eastward. We left camp at 3 P.M., and following up the river shortly afterwards, passed through a very small patch of thicket, with climbing-plants crossing from tree to tree, obliging us to cut our way. The soil was alluvial, and very soft. Here I saw ferns for the first time—a delicate feathery-leaved plant. After emerging from this thicket, we travelled over undulating country, gradually ascending in our course, which was now due south. The flat through which we now passed was bounded east and west by hills rising like walls, with occasional valleys between, of apparently similar flat land. The distance between the hills on either side was at first but a few yards, but this gradually extended, and the average width of the plain during the 6 miles we went over it was almost, if not quite, half a mile. It was splendidly grassed, and the herbage was thinner and less rank than on the north side of the Glenelg, and more fitted for the immediate use of stock. The soil was generally gravelly, sometimes sandy, and occasionally rich loam. Judging by the habits and tastes of our horses, I should prefer taking up land of this description for stock to the more densely-grassed country contained in Mr. McRae's run; but this was comparatively a small patch, although the valleys running at right angles on either side, as well as many of the hills, seemed equally well grassed. The McRae had now dwindled into a creek, no longer broken into wide reaches; and after following it along the valleys, it branched off, one stream coming from the westward and the other from the southward. The latter we considered the main stream, and, as it was in our course, continued to follow it up through rocky country. After travelling about 3 miles among our old friends the sandstones, we camped for the night in a narrow valley, through which the McRae, a small but still running stream, flowed, and which was fairly grassed. The hills on either side are not high, and the horses relished the grass, which was short and sweet. Noticed the banksia-tree on the banks of the McRae, not having seen it north of the Glenelg. It is short and scrubby, and seems

out of its latitude. It is apparently peculiar to the McRae. Several kangaroos were started during our day's march. Mr. Cowle informed me that we were 2500 feet above the sea-level. I should not have thought so; but as we have been ascending, generally gradually, and sometimes abruptly, since we left the Glenelg, I suppose it must be so. We had now come about 19 miles south of our *depôt-camp*; and as there is nothing to prevent the movement of pack-horses, while there is some prospect of our proceeding still further south, I determined to shift the *depôt-camp*, in furtherance of my slow and sure plan of feeling the way in front, and being able to calculate as nearly as possible how long it would take to remove the party back on our tracks through a country which offered no serious impediment, now that we had discovered passes through the hills, to tired and jaded horses. Mr. Cowle places our present camp in about latitude 16° s.

April 19th.—Up at 10 minutes past 5, after a cool and refreshing night, and started at a quarter past 7. We passed yesterday's shady bivouac at 9. Noticed in the country we passed over some scrubby stunted cypress, which also grew in the neighbourhood of Camden Harbour. It is not however plentiful, nor is it useful for any purpose, being a mere bush. The box-tree and the cotton-tree very plentiful here and throughout our line of route, the former a very hard and the latter a very soft wood. Got to the flat, where we slept, on Monday at 20 minutes past 12. Left at 3 P.M. and got back to the *depôt* at a quarter past 5, travelling back on our tracks with good speed. Resolved to rest our horses until Friday, and then move on.

April 21st.—Did not start until 8 o'clock. Proceeded to our sleeping-camp of Monday and had to halt, my horse having twisted off its off hind-shoe in the ranges. Noticed more particularly at this spot the native apple-trees. They were loaded with fruit, about the size of a small apple, and which I have formerly described. The tree is about 30 feet high, the stem 6 inches diameter; bark dark brown, lying in flakes; leaves in pairs, eight pairs being on one stalk, of a light-green colour, narrow and pointed at the end, about $2\frac{1}{2}$ inches long and 1 inch wide in the broadest part; the stalk upon which the leaves are placed 15 inches long. The shrub called the sand-paper plant is also here, as well as at Camden Harbour. The leaves are dark green, with a rough upper surface, like fine sand-paper; they are dry and crisp, but not brittle or easily broken. The leaves grow in pairs, upon a stem rising from the ground about 4 feet high. They are $3\frac{1}{2}$ inches long and 2 inches wide, and nearly oval. There were trees in our neighbourhood, the stem clothed with brown stringy bark, the branches white and smooth, like the ordinary white gum of the country,

and the leaves were also precisely similar. It presented a very strange appearance, but my companions recognised it as the "Gum-top Stringy-bark" of Victoria. A graceful-looking tree close by attracted my attention. It was 40 feet high, the stem 4 inches in diameter, leaves dark yellowish green, 6 inches long, $2\frac{1}{2}$ inches wide, thick, and rounded at the apex. Started from this camp at a quarter past 2, and at 5 o'clock halted on the right bank of the McRae, in splendid feed of kangaroo-grass up to the horses' bellies. We were on a small flat containing about 100 acres of this feed, which grew on clayey soil, and our camp is fixed in a clump of young trees about 60 or 70 yards from the river's bank. The river flows from south to north, and here forms the arc of a bow, which encloses our flat. On the opposite or west side of the stream the sandstone-hills rise to a great height, sinking lower towards the south.

April 22nd.—At 9 o'clock this morning we arrived at our destination, the junction of the two creeks. Resolved to halt here until noonday, and then push on a flying party to the southward. We are on a rocky piece of ground, with the McRae, now a mere brook, running close by. About our camp lizards of every size and colour sport among the rocks.

April 23rd.—There was a cool breeze from the southward this morning, but the sun's rays were very powerful. We have lost mosquitoes, sandflies, and other flies, but the ticks are very troublesome, crawling about in every direction, and much annoying the horses. Six or seven are cut out of our nags at one time. The hawks still accompany us, and one was caught by hand. When laid down he stretched his legs, shut his eyes, and was to all appearance—what he intended us to believe—dead. Upon moving a step or two back, he raised his head, and seeing that simulating death would not do, commenced pecking at the finger of his captor, who had approached again towards him. When he saw that there was no one nearer to him than a few yards, he leisurely flew a short distance off. Bathed in a narrow reach of the McRae, but without much comfort, the bottom being composed of sharp-pointed rocks, the water hot, and leeches in great numbers. Leeches were not met with in the Glenelg, nor do we hear of their having been seen in the neighbourhood of Camden Harbour. They seem to be peculiar to the McRae, as far as my experience goes. Mr. Cowle makes the latitude of our camp $15^{\circ} 59' 8''$.

April 24th.—Started at a quarter past 7 upon our exploring trip. We took with us three days' provisions, intending, unless compelled to return in consequence of losing shoes, to be away from camp for that period. Arrived at our halting-place of Tuesday last at 8 A.M., and continuing to ascend the valley for about half a mile farther on, we reached the summit of the range

up which we had been travelling since we left the Glenelg. Here we dismounted, and leaving the horses in Billy's charge, climbed up the highest hill, which had an elevation of about 100 feet above the valley, and may be considered the highest point of this part of the range. The view was extensive, and the following bearings were taken by Mr. Cowle and entered in my note-book at the time:—A hill w. by n., distant about 9 miles, apparently sandy, was supposed at the time to be the Red Cone Hill, near Doubtful Bay, but this cannot be, as, upon reference to the map, that hill appears to the southward of our position. The one we saw is a remarkable hill, and easy of identification; Mount Lyell n. by w. $\frac{1}{2}$ w.,* about 20 miles; Mount Double Cone n.w. by n., 25 miles; a table hill n. $\frac{3}{4}$ e., about 35 miles. This we conjectured to be Mount Waterloo. In our course there were three distinct ranges of hills, all of which seemed to be much lower than the one we were on. Their course averaged east and west. The nearest and smallest range was distant about 5 miles; the second, somewhat higher, about 10 miles; and the third, the highest, which looked blue in the distance, not less than 25 miles. The country between us and the nearest range appeared practicable. Mr. Cowle considered that we were now 3000 feet above the level of the sea. As this is the highest point of the range in this direction, and the spot is prominent, I give it a name, and propose, with the Governor's consent, to call the hill Mount Cowle. Descending the hill, we remounted our horses and proceeded over the crest of the range. Immediately after leaving the source of the McRae on one side, flowing north, we struck the head of another creek on the southern side, and flowing south. This we followed over very rugged country (the country, by the by, which looked practicable from the hill-top) for about 2 miles, when we were stopped by a complete block of rocks before and on either side of us. We had for some time been driven into the stream, there being no passage on either side, and had made our way with difficulty among large boulders of rock. The stream had increased rapidly in width, depth, and volume, and though so near its source, was larger than the McRae, at our second dépôt. Mr. Hindhaugh went ahead a short distance on foot to see whether there was any chance of our getting along by another route, and on his return reported that the country was impassable for horses. He had gone down the rivulet for about a quarter of a mile, when it was joined by a larger stream, and the united waters flowed towards the westward. It would most probably be joined by numerous creeks from this and the next parallel range, and by the time it reached the sea

* [According to the tracing subsequently furnished by Mr. Cowle, Mount Lyell is placed a point or two to the eastward of north from Mount Cowle.—R. J. S.]

coast have become a river of some magnitude. I think it not improbable that, in the valley between either of the ranges which we saw from Mount Cowle, a stream of more or less magnitude flows towards the sea. We retraced our steps, leading our horses over the worst portions of the ravine in which we were confined, and encamped higher up the creek at 10 minutes to 12. The latitude, by observation, of our camping-ground, was $16^{\circ} 2'$ and some odd seconds, our farthest south being as nearly as possible $16^{\circ} 3'$. Mr. Cowle made the longitude of our halting-place $124^{\circ} 55'$ E. It was a pretty spot, overhung by sandstone cliffs, between which the stream rushed over the rocks. On a ledge of rock some 10 or 12 feet above the water we boiled the water for tea, the horses feeding higher up the valley, where there was a diminutive flat. Between the fissures of the rocks a sufficient number of trees flourished to throw a grateful shade, some of which I had not noticed before. There was one light grey-barked tree, with dark-green leaves, pointed, $3\frac{1}{2}$ inches long by 2 broad, with a fruit somewhat resembling the seed-vessels of the rose, which, when ripe, were of a dark-red colour. They were sweet to the taste, and grew upon a short stalk in clusters of 6 or 8. Mr. Hindhaugh brought in a sample of a narrow-leaved palm, the leaves diminishing in breadth from half an inch to the thickness of a thread; they were fine and tough, and seemed well adapted for the manufacture of hats, and when prepared, of cordage. I did not see the palm itself, nor were any more seen by Mr. Hindhaugh, except a few in the locality where he procured this specimen. I blazed some saplings at this place, from which exuded a large quantity of white viscid fluid, which turned dark on exposure to the light, looking not unlike india-rubber. One of the trees was marked by Mr. Hindhaugh J. H., his initials, and these marks may serve to identify the spot at some future time. The lizards were very plentiful on the rocks, and they seemed to be of the same colour as the particular mass of rock on which they sported—the various shades of brown and yellow. They were most expert fly-catchers. Resumed our retrograde march at 3 o'clock, it being my determination to return to depôt, there appearing to be no opening in this direction, and follow the branch of the McRae, which came from the westward, hoping to find an outlet to the southward. We had not gone more than a mile when Mr. Cowle's horse lost a shoe, and we halted while Mr. Hindhaugh shod the animal. Our last nail was thus consumed, and, recollecting the nature of the country we had to pass on our way home, and knowing how utterly useless a shoeless horse must be in these ranges, I determined to return back without delay. Before travelling in this country, not only should the horses be well shod, but each rider should be supplied with a few spare shoes and

plenty of nails. The shoes themselves are seldom lost. We arrived at the depôt-camp by sundown, when I gave the order for commencing our homeward march the next morning. Mr. McRae returned from a pedestrian trip shortly after my arrival. He had been with Graham up the western branch of the river, and after getting over some rough-and-tumble country, which however could be traversed by horses, they gained the summit of some table-land, which was, for this place, fair travelling, and extended in the direction we intended to have gone. He considered the opening at the spot where he turned back, about 4 miles from camp, of a promising nature. During our trip to-day there was less grass than usual, spinifex being the rule.

April 25th.—Returned on our tracks. Tried occasionally to get a better crossing-place over the McRae, but were not successful. These crossings caused some little excitement, and the leading horsemen generally waited on the opposite side to see the whole party safely over. The scene thus viewed was not devoid of interest. Masses of rocky hill, rising perpendicularly several hundred feet above the water's edge, with just sufficient ledge at the base to permit the party in single file to travel along; the river tumbling over immense stones at the ford; the hills, with their accommodating ledge, on the other side. We (Mr. McRae and myself) just got across the third ford, and going a little down the right bank of the river, turn, and after a few minutes' halt, push through a thicket, which, although we have broken through it three times before, seems as impervious as ever. It is formed of stiff thorny trees, or rather shrubs, which spring up from among the stones; no vestige of earth to be seen. They are sufficiently high to meet overhead. What with guiding the horses over the stones, and defending head, body, and limbs from the thickets, all are well employed. But this is not all. Showers of green ants descend upon our heads and shoulders, and it must have been amusing to a looker-on to see persons at the same time hastily engaged protecting themselves from ants, thickets, and the rocks at their feet. Happily the thicket is a small one, and we emerge hot enough, but with leisure, to destroy the insects which have been persecuting us. The green-ant is about half an inch long, of a light arsenic green, and dwells amidst the foliage of trees. Their bite is very sharp, but beyond the pain at the time, no great inconvenience is suffered. A small black ant, with a red head, is a more troublesome insect. For some time after being bitten there is much pain, and the part swells. Their bite, in its effect, is similar to that of the serjeant-ant. Luckily they are not so plentiful as the green ant, nor do they reside in trees, otherwise passing among their habitations would be a task unpleasant, to say the least. We halted early at the camping-place of Monday week, and where

Mr. McRae had marked the white-gum-trees. Here we remained for the rest of the day. Two miles south of our present halting-place we came down a very steep hill, to avoid that which we had hitherto ascended and descended, and which I described in a former part of my Journal. We did not gain by the change; it was quite as steep as the hill we avoided, but somewhat shorter. Discovered among the rocks of our camping-place a creeping plant, with leaves and tendrils like those of the cucumber, only much smaller. The fruit was the size of a small cherry, quite round, of a bright scarlet colour. The taste is like that of the cucumber. This is the most uninteresting, as regards situation and aspect, of our halting-camps among the ranges, and yet there is a greater variety of trees and vegetable productions than in any other. Each time that we have visited it I have found something new. I collect, as well as I can, specimens of fruits and seeds, but from not having proper receptacles, many of them get mixed, crushed, and broken. I also collect ripe seeds of every plant near our camps, although I do not know the nature or the character of the blossoms—many of them are creepers. This has been an extremely hot day. Mr. McRae told me that he had seen, though not in this part of the North district, a guana having a hood, which, when the creature is in repose, lies flat on its shoulders and back, but, when it moves, is spread open, and when it jumps from tree to tree, appears to act like a wing. It is of moderate size—the guana, not the hood. Since my return my son informs me that he has seen one of these animals. We saw very few guanans during our journey, and I have not met with a snake in all my rambles on foot and on horseback; but two have been seen by our party during this journey—a small and a large one—and three were killed at the Government Camp in our absence—one of them upwards of 10 feet long. They cannot be considered plentiful in this part of Australia. We have seen numbers of butterflies of endless variety and hue. An entomologist might spend some months very pleasantly and profitably here. In fact there is a new field opened for students of Natural History in every branch.

April 26th.—Did not start until half-past 7. Arrived at dépôt No. 1 at 10 minutes past 10, and crossed the rapids at the Glenelg at 10 minutes to 11. Here we halted. Mr. Cowle states our latitude to be $15^{\circ} 44' 28''$. He is convinced that these are not the rapids of Grey, which are 2 miles further up the river. I did intend strolling off to visit the lower rapids, but some of the horses had swollen backs, and I thought it advisable to defer this visit to a future time, and bring the animals home before they got worse. By shifting saddles, padding, &c., we have hitherto managed to save the horses, who have only suffered in the feet

and legs. In condition they are not worse—some of them I think are better—than when they left Camden Harbour. Noticed a herb with a grass-like stem, with seeds like those of wheat, but reversed, lying upon the stem like the barbs of a spear. We started at a quarter to 3, and after crossing the divided stream of the Glenelg—we had been encamped on the island between the two streams—struck a direct course, instead of following back our tracks by the bank of the Glenelg. The numerous streams which impeded our progress before therefore passed to the eastward or higher up, and this, together with the drying up of the water, enabled us to push along with greater ease and rapidity. We passed over lightly-timbered and well-grassed country, tolerably level, with clayey, sandy, and gravelly soil, sometimes one and sometimes the others, but the same description of herbage and timber on each. In crossing the stream upon which we camped on the 16th instant,—and which we called Mosquito Creek—but higher up, my horse got jammed between the banks, and we had some difficulty in extricating him, the bottom being soft, the banks steep, and the stream-bed narrow. Shortly after leaving this place, we came upon our outward track, which was very plain, and which we followed. Most of the streams which had contained water when we passed a fortnight since were now dry, and we had to push on until dusk, when we were fortunate enough to arrive at the creek known to us as Frying-pan Creek. There was plenty of water here. We camped on the south bank, and soon found we were in a mosquito neighbourhood. There was plenty of grass, but the ground was so stony, that it was a difficult matter to pick out sleeping ground. However it was not of much consequence, as the mosquitoes would not let us rest. Mount Lyell bears north-west, about half a mile distant. This two-peaked hill is connected at the bottom by rising ground. There is no apparent difference in the height of the two peaks, looking from our camp at daylight. Both peaks were composed of bare red rock—either basalt or trap. After leaving the Glenelg, and not far from its banks, the ground was covered with lake-coloured everlastings; further south the everlastings are dark crimson, and near Camden Harbour pink and white.

April 27th.—We were all up before daylight, but the horses had rambled further than usual, and we could not start until half-past 8. We crossed the Gairdner at 5 minutes past 2, higher up than on our outward trip, at a gravelly ford. The stream-beds which we crossed generally contained water, but not so much as when we passed before; the water was now for the most part in pools. Camped on the Gairdner. Particularly noticed Mount Lyell in passing. There are neither trees nor herbage on either peak, and very little of either on any part of the hill. At its

base there is the usual supply of grass and scattered timber. On a hill to the north of Mount Lyell we collected some very large pods of a triangular shape, from a creeper with a thin stalk. The pods were disproportioned to the size of the stalk, nearly as much so as a melon is to a melon-vine. They were not quite ripe, but ripened by keeping, and, bursting open, exhibited a large quantity of a cotton-like substance, with which the seeds were enveloped. Encamped at the Gairdner, under the so-called mulberry-tree, the large dark leaves of which shaded us from the sun. Some of the ripe fruit dropped, but they were full of maggots. Left the Gairdner at 20 minutes past 3, and at 5 o'clock halted for the night on a creek running south, near the largest currant-tree I have seen. It was loaded with fruit, which we obtained by cutting down large boughs. We have not seen much game since leaving the Glenelg. Yesterday we came across two emus, and to-day saw one kangaroo, and birds called native companions—a species of heron apparently. They were large birds, and I took them at first for turkeys. The creek was very bare of water, which seemed to be drying up fast. The mosquitoes were very troublesome, as they have been at every place north of the Glenelg and at our first dépôt south of that river. Some of the people declared they were three inches long, but this is not the case. The largest may be half an inch long. There is no doubt but that they are great pests, and I do not envy the first settlers of this portion of Western Australia.

April 28th.—We proceeded homewards by 10 o'clock, and were again among those from whom we parted a short time ago, and who came around to know all about the new country we had seen.

If the result of our journey is not what we hoped, it is not altogether unsatisfactory. Our knowledge of this portion of the country has been enlarged, and we have no longer to rely upon the statements, or to be guided by the opinions, of others. Our expedition has proved to my satisfaction that the country over which we travelled, south of the Glenelg, was similar in every respect to that travelled over by Grey some 15 miles to the eastward, and the probability is that the intervening country is of a like nature. Whether it is as rugged and unpromising to the westward I hope to discover by sending an expedition in that direction. At the spot where we turned back, which was a few miles south of Grey's, and some 10 or 12 miles north of Lushington's farthest, the prospect of advancing in our course, on horseback, was very poor. There was an opening to the westward which might possibly lead to an outlet from the ranges in a southerly direction. This will have to be tried. Should the attempt

fail, then horses must be taken as far as practicable, and from this point parties on foot must explore the ranges.

Should level and fertile country be discovered south of the ranges, then the hills over which we travelled will not be valueless. Not only do they admit of stock being driven over, supplying abundance of feed and water, but the elevation of the land will render it well adapted for runs upon which to depasture, at certain seasons, a portion of the stock which at other times feed on the plains. The land does not of course yield so much grass, even in the most fertile spots, as in the plains, much of the country from its nature being unproductive; yet a limited number of stock may be kept in good health and condition in the ranges, which, I am convinced, will become valuable when the low country on either side is occupied.

I do not consider, nor do those whom I have consulted consider, that sheep ought to be imported *at present*. Setting aside all question of climate, the feed in its present state is not adapted for sheep, but for large stock only. To bring sheep into this district would, to say the least, be attended with much risk. Those that have already been introduced have not done so well as to encourage the importation of others. I am aware of the force of the arguments employed to show that the fate of the sheep landed at Camden Harbour ought not to influence speculators. It is said that they were too young to withstand the effects of a sea-voyage and a tropical climate, that they were not properly tended, that they arrived at an exceptional season, that they were depastured in the neighbourhood of the sea-coast, and so on. I allow all this, but, at the same time, I do not see any reason for not discouraging the importation of sheep *for the present*. Whether they will ultimately succeed, when the feed is cropped down by larger stock, I cannot tell—time will show.

For horses, it is the opinion of every one that I have spoken to on the subject, the country is admirably adapted. The feed is well fitted for horses, who improve in condition, and they may be reared in large numbers for markets close at hand.

Whether the feed and climate is adapted for cattle we have had no opportunity of judging from personal observation, as none have been imported, but those who have been accustomed to this description of stock speak highly of the capabilities of the country for such purpose. One fact appears tolerably clear—that there is no poisonous plant calculated to affect ruminating animals—or in fact others, horses doing well—for none of the sheep have died from the effects of poison. It was supposed, shortly after we landed, that some of the Government sheep had died from the effects of poison. I did not credit it at the time, and I am now convinced that no vegetable poison exists. I speak of course only of the

country near the sea-coasts, where the sheep have been depastured, but I may add that I have seen nothing in my travels at all resembling the poison plant of South-Western Australia. What will be the value of horned stock reared here will depend upon the progress of settlement. Without a dense population, it appears to me that their value must be estimated by that of the tallow, hides, and horns they yield, less the cost of production.

I do not say much respecting the agricultural capabilities of the country over which we passed, because our course would necessarily lead us from the low country. I must confess, however, that the alluvial land on the banks of rivers and streams was of less extent than I anticipated. Of its richness there can be no doubt. But were the quantity ever so great, it would not promote settlement. In this climate no white man could till the ground, nor would any white man be able long to endure the attacks of the insect enemies. In most parts of Australia these nuisances disappear, or at all events become less, as settlement extends, but here the nature of the crop on low alluvial river-side lands would encourage, and not disperse, the mosquitoes.

If coolie labour is to be employed it will be when pastoral occupations gradually lead to others, and when wealthy speculators grow articles of commercial value. Rice, cotton, sugar, indigo, tea, coffee, &c., will not be cultivated by the class of men who usually emigrate to new countries and form the bulk of the population. Except in the event of some extraordinary or exceptional inducement for immigration, such as gold in large quantities, or other metals which may be easily worked and transported to the port of shipment, I do not conceive that the country I have seen will be the home of a large European population. It is essentially a pastoral country, and will be permanently settled only by the extension of pastoral occupation from the southward. It is my conviction of this fact and my knowledge that establishments have already been formed along the north-west coast, that make me so anxious to penetrate the southern barrier which separates this portion of Australia from the more level country to the southward. We are now but a comparatively short distance from Roebuck Bay. When once a pass is found—it is not more than two weeks' journey from our furthest depôt, and an opening once made, extension of pastoral occupation is but a question of time.

Of the natural resources of the country over which we passed, I am not qualified to give a scientific opinion. There are many vegetable productions, which may become, which perhaps are, valuable in connection with arts and manufactures, medicine, &c., but I cannot state the fact with certainty. Of the trees, I may safely say that for building, for furniture, or even for fencing, but very few are available, and those in situations which would require

their being consumed on the spot. Some of the timber might be valuable for turnery and small ornamental work, for it is very hard and close-grained, but for all domestic and field purposes wood will have to be imported, especially for the coast settlements—if any.

On the sandstone ranges there are no indications of mineral deposits, but at the base of the hills and in the lower valleys, among the basalt and trap, there are evident signs of much metallic accumulation. Our time did not permit us to make a close examination; nor do I think the knowledge possessed by any of our party was sufficient to render the time profitably employed which was devoted to mineral researches. I have mentioned one spot as offering a prospect of gold-discovery, and also alluded to the specimen of copper-ore brought from the Glenelg. I may likewise state that there was an abundance of iron ores, some of them very pretty specimens, but otherwise of no value in a new country.

The health of every member of the party, excepting Mr. Cowle, who had an attack of incipient fever for two or three days, was excellent. Not only did cuts and sores, brought with us from Camden Harbour, rapidly heal, but any damage received en route from stone or wood, also healed in the course of a few days. Men and horses both looked as well on their return as when they started. Even the horses' legs looked healthy, considering the battering they had received. With fine weather, good water, the absence of all privation, or even annoyance, except the mosquitoes, a short trip, and good health, it is no wonder that we were all pleased with our journey. For my part I have seldom passed a more enjoyable time than that which I spent during our wanderings among the sandstones.

XVI.—*Marine Survey of the Northern Territory of South Australia.* By Mr. F. HOWARD, Master R.N., to the Governor of South Australia.

(Communicated by F. S. DUTTON, Esq., F.R.G.S.)

On the 13th of May, having embarked the Government Resident in the surveying schooner *Beatrice*, we proceeded to ascend the Adelaide River, it being the intention of Colonel Finnis to explore the upper part. We arrived at an anchorage about 6 sea miles above the farthest point reached by the *Beatrice* last year on the 17th.

The same evening we were visited by a party of natives, who came again the next morning; but on this occasion they were not